# 1970 OPERATING SUMMARY





# FERGUS

## water pollution control plant



ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

Water management in Ontario

Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 195
Ontario

Once again we have the privilege of submitting to you our latest detailed report on financial progress and technical activity at your water pollution control plant.

The statistical information contained in this annual operating summary will undoubtedly be a useful barometer of efficiency. Of particular interest will be the comments and recommendations of the regional operations engineer, who was intimately connected with day-to-day operation throughout 1970.

Together with the extensive cost data provided, this information should assist greatly in your general understanding of the problems met and dealt with, and in furnishing a yardstick for possible future expansion.

D. S. Caverly,
General Manager.

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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# FERGUS

# water pollution control plant

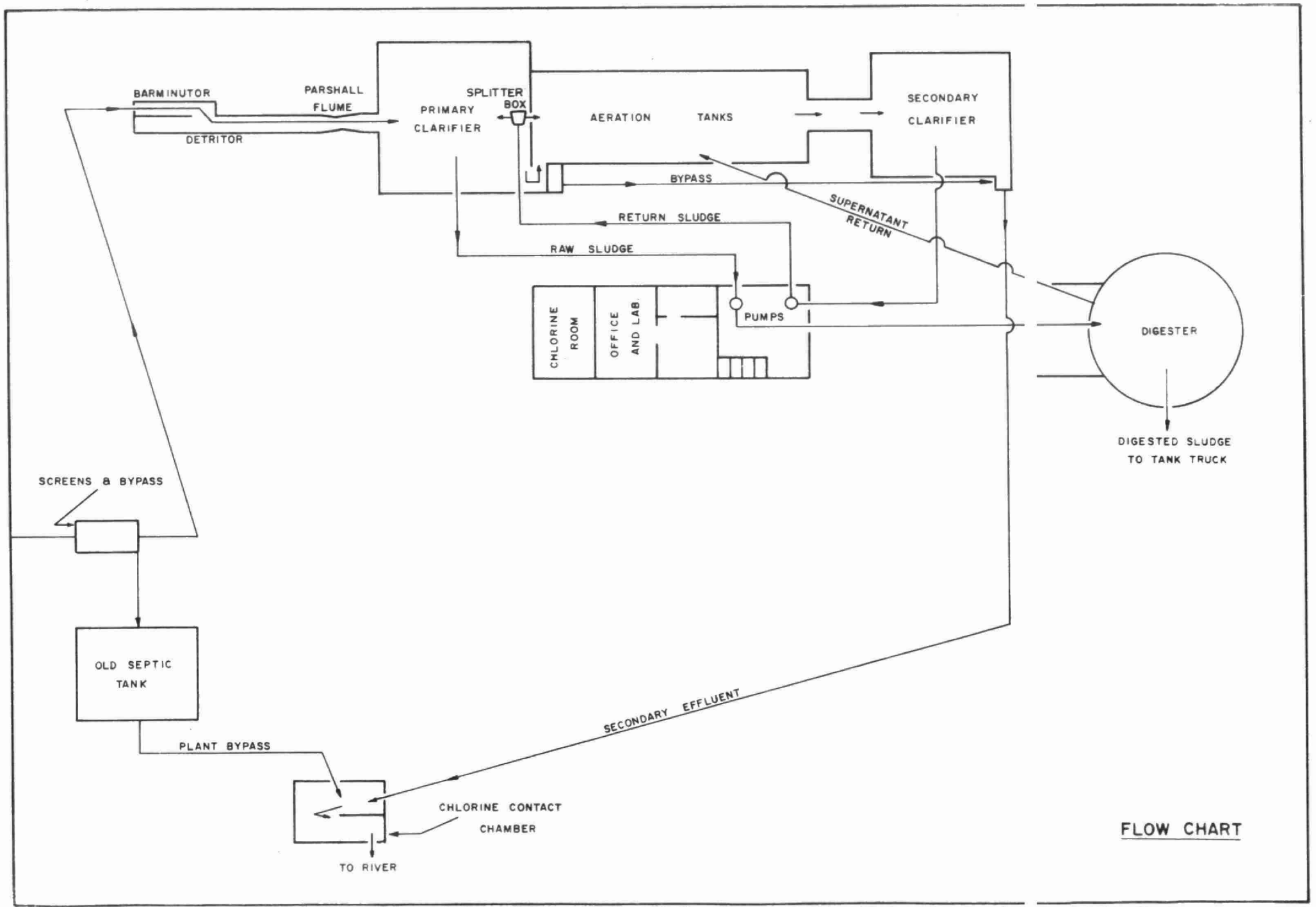
operated for

THE TOWN OF FERGUS

by the

ONTARIO WATER RESOURCES COMMISSION

# 1970 ANNUAL OPERATING SUMMARY


BARMINUTOR
PARSHALL FLUME
DETRITOR
PRIMARY CLARIFIER
SPLITTER BOX
AERATION TANKS
SECONDARY CLARIFIER
BYPASS
SUPERNATANT RETURN
RETURN SLUDGE
RAW SLUDGE
CHLORINE ROOM
OFFICE AND LAB.
PUMPS
DIGESTER
DIGESTED SLUDGE TO TANK TRUCK
SCREENS & BYPASS
OLD SEPTIC TANK
PLANT BYPASS
SECONDARY EFFLUENT
CHLORINE CONTACT CHAMBER
TO RIVER
FLOW CHART

# DESIGN DATA

| | | | |
|---|---|---|---|
| PROJECT NO. | 2-0023-58 | TREATMENT | Activated Sludge |
| DESIGN FLOW | 0.6 mgd | DESIGN POPULATION | 4,700 |
| BOD - Raw Sewage | 200 mg/l | SS - Raw Sewage | 200 mg/l |
| - Removal | 90% | - Removal | 90% |

## PRIMARY TREATMENT

### Grit Removal

Type: Dorr-Oliver, Type T Detritor

### Comminution

Type: Barminutor
Size: Model B (18")

### Primary Sedimentation

Type: Dorr-Oliver
Size: One 40' x 40' x 9' swd (90,000 gal)
Retention: 3.6 hours
Loading: Surface, 267 gal/ft$^2$/day
Weir, 2,670 gal/ft/day

## SECONDARY TREATMENT

### Aeration Tank

Type: Mechanical, single pass
Size: One 72' x 24' x 10' 7" swd (22,000 cu ft or 137,500 gal)
Retention: 5.5 hours

### Aerators

- Three Ames Crosta driven by a single motor

### Secondary Sedimentation

Type: Dorr-Oliver
Size: One 35' x 35' x 9' swd (11,000 cu ft or 68,500 gal)
Retention: 2.74 hours
Loading: Surface, 490 gal/ft$^2$/day
Weir, 4,280 gal/ft/day

## CHLORINATION

Type: BIF Model EVS
Size: 200 lb/day

### Chlorine Contact Chamber

Size: 13½' (avg) x 12' x 6' deep (911 cu ft or 5,670 gal)
Retention: 15 min

## OUTFALL

- to Grand River

## SLUDGE HANDLING

### Digestion System

Type: Single stage, with floating cover and one Dorr draft tube mixer
Size: 35' dia x 22' swd (22,700 cu ft or 141,000 gal)
Loading: 1.40 lb/ft$^3$/mo

### Drying Beds

- total area, 7,200 sq ft (discontinued use in 1964)

# '70 REVIEW

| FLOWS | DAILY FLOW mil gal | OCCURRING IN THE MONTH OF | MONTHLY FLOW mil gal | OCCURRING IN THE MONTH OF |
|---|---|---|---|---|
| Average | .70 | — | 21.2 | — |
| High | .97 | April | 29.1 | April |
| Low | .53 | February | 14.9 | February |

## GENERAL

The Fergus Water Pollution Control plant is designed for a population of 4,700 and flows of 0.60 mgd. The plant consists of primary and secondary treatment facilities, chlorination facilities, and sludge digestion facilities.

During the year, both the Elora and Fergus Water Pollution Control plants were operated by a staff of two stationed at Fergus.

Under the supervision of head office engineers the staff operated a clean, attractive and efficient plant for the Town of Fergus.

## EXPENDITURES

A total flow of 254.5 million gallons was treated at a cost of $24,078.25. The cost per pound of BOD removed was nine cents and the cost per million gallons treated was $94.50.

## PLANT FLOWS

The 1970 average daily flow of 0.70 million gallons exceeded the design capacity of the plant by 17%. The design capacity was exceeded 75% of the time during the year.

## PLANT EFFICIENCY

The average raw sewage BOD and suspended solids were 126 and 164 mg/l respectively. The average raw sewage BOD and suspended solids exceeded the design loading of 200 mg/l, 8% and 50% of the time. The BOD and suspended solids removal efficiencies were 79 and 90%, producing a plant effluent which averaged 26 mg/l BOD and 16 mg/l suspended solids.

The OWRC final effluent BOD and suspended solids objectives of 15 mg/l for each were exceeded 75 and 74% of the time.

## SLUDGE DIGESTION

A total of 2114 cubic yards of digested sludge was hauled from the plant to farm fields.

## CONCLUSIONS

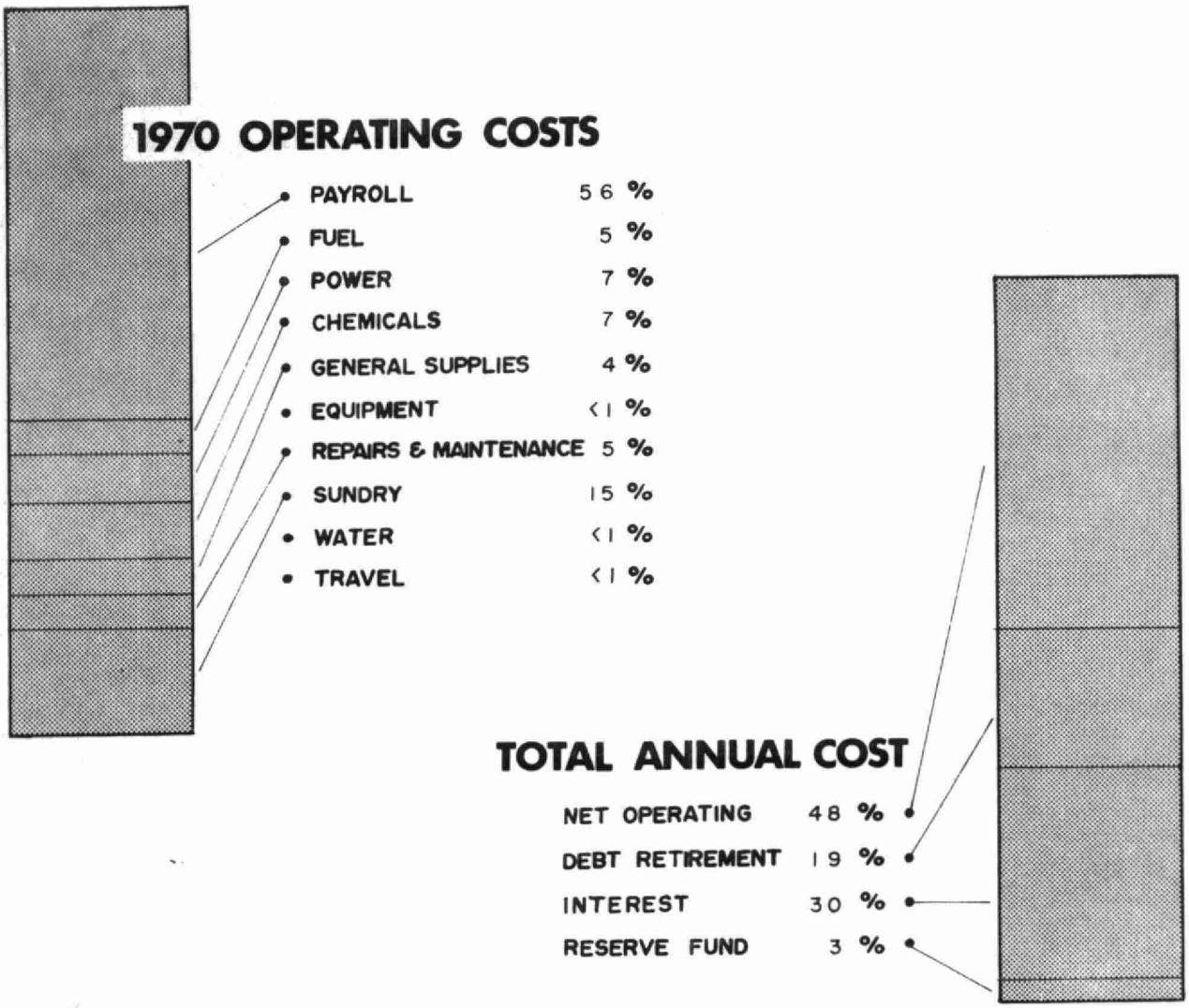
The effect of the hydraulic overload is reflected in the reduction in plant efficiency. Final plans to expand the plant to 1.1 mgd are being prepared. Construction should begin in the spring of 1971.

# PROJECT COSTS

| | |
|---|---|
| NET CAPITAL COST (Final) | $277,393.48 |
| DEDUCT - Portion financed by CMHC/MDLB (Final) | - |
| Long Term Debt to OWRC | $277.393.48 |
| Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970 | $136,346.66 |
| Net Operating | $ 24,104.52 |
| Debt Retirement | 10,064.00 |
| Reserve | 1,627.45 |
| Interest Charged | 15,541.31 |
| TOTAL | $ 51,337.28 |

RESERVE ACCOUNT

| | |
|---|---|
| Balance @ January 1, 1970 | $ 11,017.14 |
| Deposited by Municipality | 1,627.45 |
| Interest Earned | 750.16 |
| | $ 13,394.75 |
| Less Expenditures | - |
| Balance @ December 31, 1970 | $ 13,394.75 |




## Yearly Operating Costs

| YEAR | MILLION GALLONS TREATED | TOTAL OPERATING COSTS | COST PER MILLION GAL | COST PER LB OF BOD REMOVED |
|---|---|---|---|---|
| 1966 | 219.05 | $20,582.17 | $ 93.96 | 4 cents |
| 1967 | 258.03 | 20,388.07 | 79.01 | 6 cents |
| 1968 | 229.31 | 22,150.62 | 96.60 | 6 cents |
| 1969 | 235.40 | 25,448.57 | 108.11 | 10 cents |
| 1970 | 254.50 | 24,078.25 | 94.61 | 13 cents |

# MONTHLY OPERATING COSTS

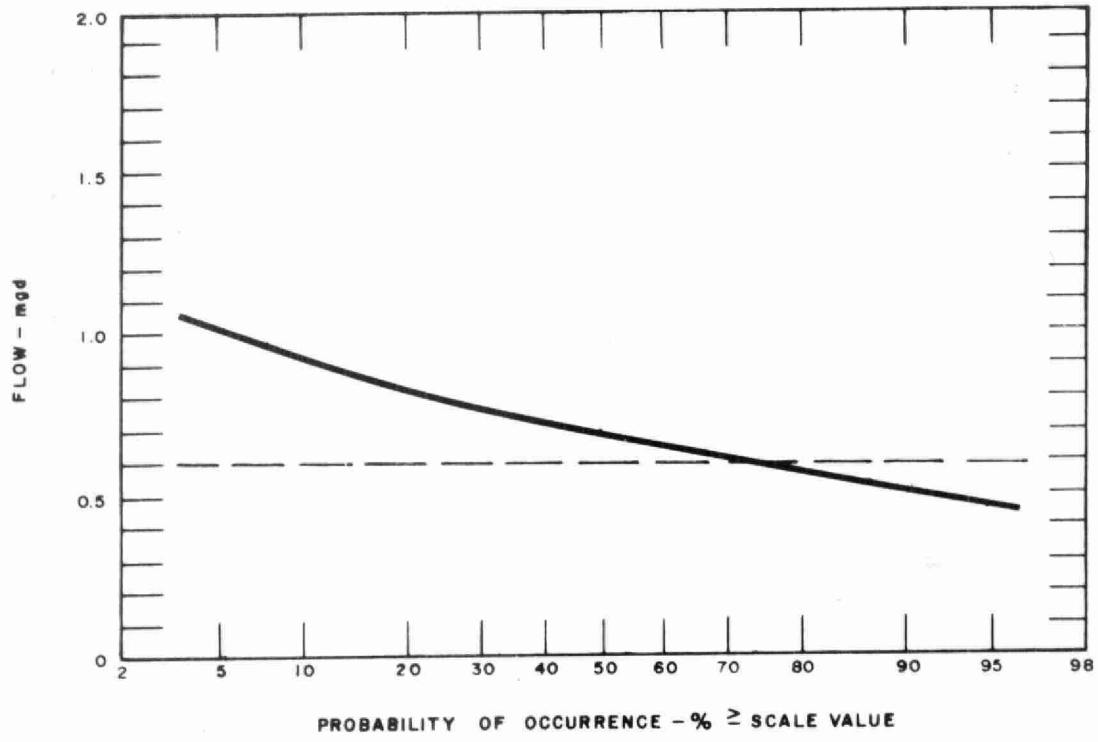
| MONTH | TOTAL EXPENDITURE | PAYROLL | CASUAL PAYROLL | FUEL | POWER | CHEMICALS | GENERAL SUPPLIES | EQUIPMENT | REPAIRS and MAINTENANCE | SUNDRY | WATER | TRAVEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JAN | 2303.65 | 1528.13 | - | 109.94 | 127.08 | - | 53.53 | 7.20 | - | 434.3 | 9.07 | 34.35 |
| FEB | 1919.89 | 1007.81 | - | 104.30 | 129.76 | 220.50 | 85.70 | - | 35.88 | 330.5 | - | 5.40 |
| MAR | 1533.70 | 994.91 | - | - | 106.08 | - | 32.78 | - | 46.77 | 346.7 | - | 6.45 |
| APR | 1688.73 | 951.86 | - | 107.10 | 105.31 | - | 20.47 | 29.93 | 39.56 | 413.5 | 10.80 | 10.20 |
| MAY | 1621.89 | 110.84 | - | 105.57 | 154.80 | - | 104.93 | - | 45.99 | 93.5 | - | 5.85 |
| JUNE | 1460.25 | 1241.83 | - | - | 142.89 | - | 23.31 | - | - | 43.3 | - | 8.85 |
| JULY | 2595.60 | 911.16 | 414.63 | 302.32 | 142.89 | 347.69 | 127.82 | - | 181.97 | 136.1 | 20.30 | 10.65 |
| AUG | 2437.58 | 1030.86 | 501.02 | 198.44 | 142.89 | 220.50 | 133.21 | - | - | 185.1 | - | 25.50 |
| SEPT | 2035.32 | 873.13 | 36.25 | - | 133.80 | 348.72 | 105.65 | - | 170.23 | 360.7 | - | 6.75 |
| OCT | 2130.76 | 999.27 | - | - | 142.89 | - | 126.38 | - | 456.44 | 361.( | 27.22 | 17.55 |
| NOV | 1966.54 | 1054.73 | - | - | 148.14 | 290.59 | 53.49 | - | 28.09 | 301.5 | - | 89.96 |
| DEC | 2384.34 | 870.38 | - | 215.81 | 158.64 | 290.59 | 185.23 | - | 122.24 | 547.( | - | (6.15) |
| TOTAL | 24078.25 | 12574.91 | 951.90 | 1143.48 | 1635.17 | 1718.59 | 1052.50 | 37.13 | 1127.17 | 3554.( | 67.39 | 215.36 |

BRACKETS INDICATE CREDIT

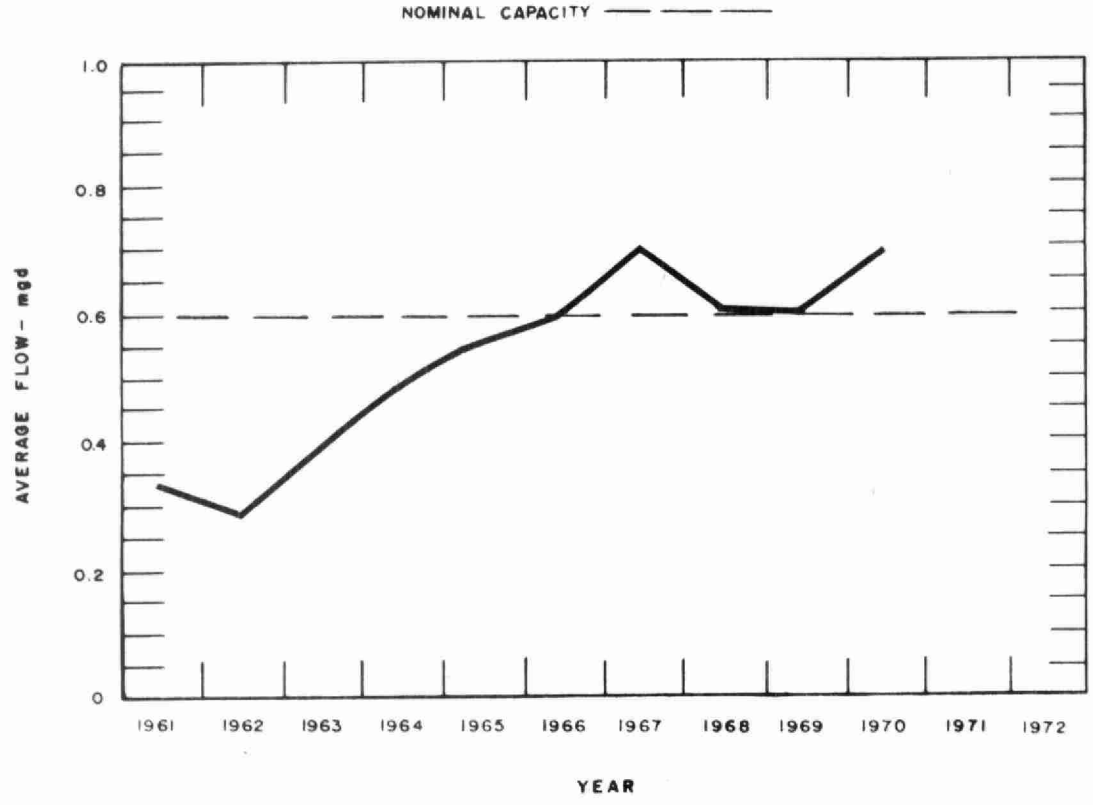
* SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE $3044.50

Note: Costs do not include year-end adjustments.

# PROCESS DATA

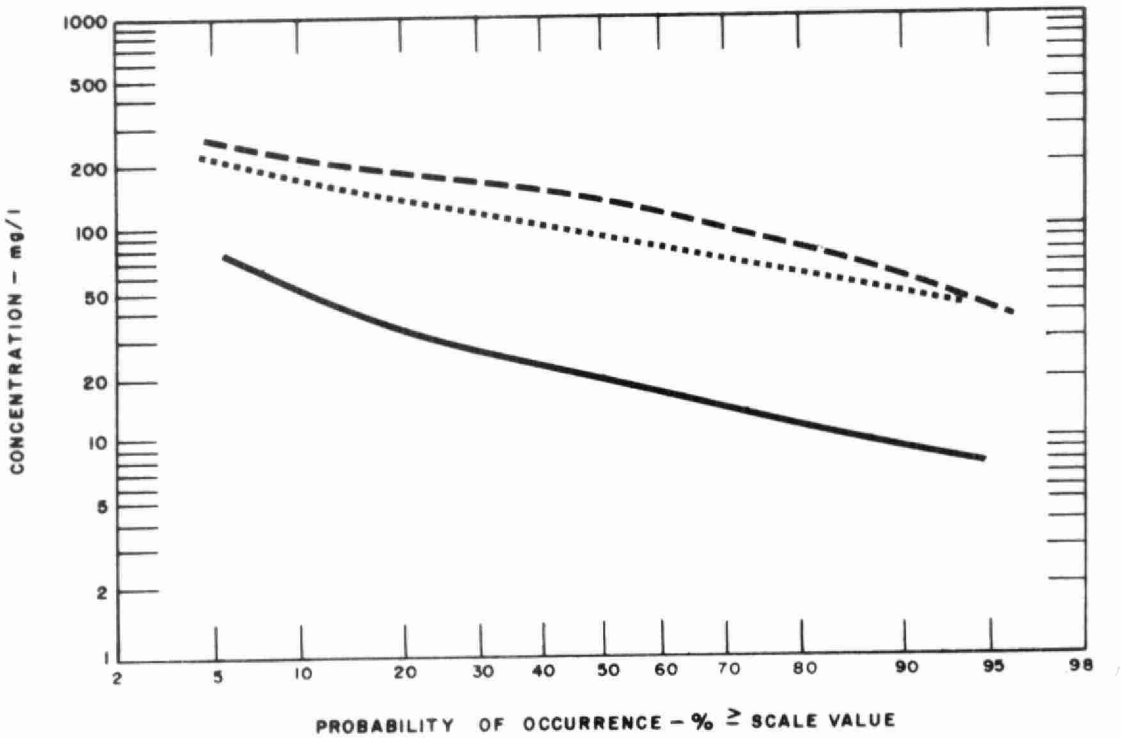

2.0
1.5
1.0
0.5
0
FLOW - mgd
2
5
10
20
30
40
50
60
70
80
90
95
98
PROBABILITY OF OCCURRENCE - % ≥ SCALE VALUE

# FLOWS

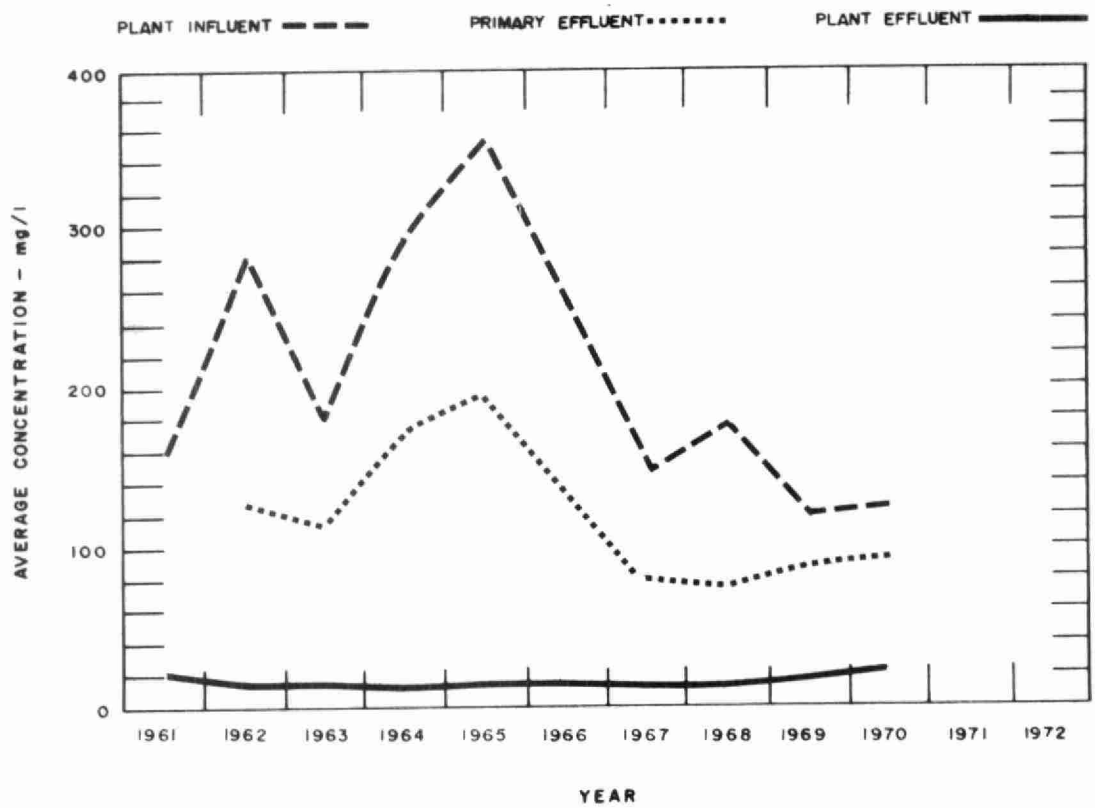

NOMINAL CAPACITY
1.0
0.8
0.6
0.4
0.2
0
AVERAGE FLOW - mgd
1961
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
YEAR

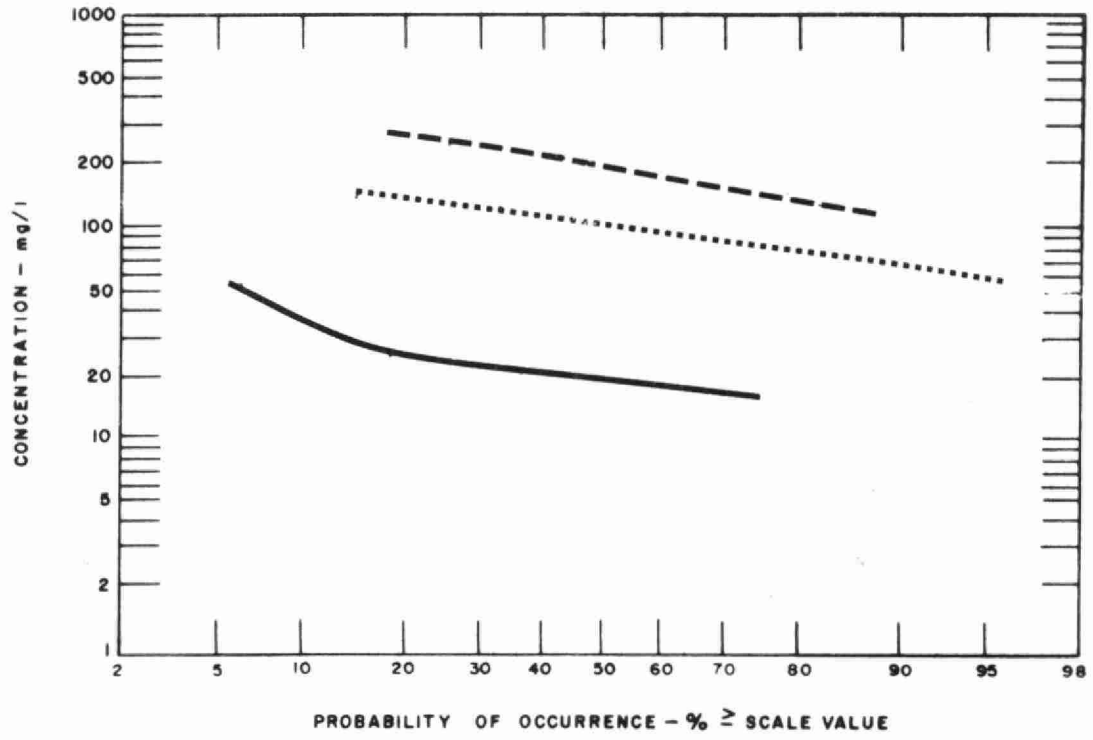
# PLANT FLOWS and CHLORINATION

| MONTH | TOTAL FLOW mil gal | AVERAGE DAILY FLOW mil gal | MAXIMUM DAILY FLOW mil gal | MINIMUM DAILY FLOW mil gal | CHLORINE USED pounds | DOSAGE mg/l |
|---|---|---|---|---|---|---|
| JAN | 17.4 | .56 | .7 | .5 | 800 | 4.7 |
| FEB | 14.9 | .53 | .6 | .5 | 540 | 4.2 |
| MAR | 22.2 | .72 | 1.0 | .4 | 750 | 3.4 |
| APR | 29.1 | .97 | 1.3 | .7 | 770 | 2.6 |
| MAY | 25.0 | .82 | .8 | .6 | 700 | 2.8 |
| JUNE | 21.2 | .70 | .9 | .5 | 720 | 3.4 |
| JULY | 21.5 | .68 | .8 | .5 | 730 | 3.4 |
| AUG | 19.2 | .62 | .7 | .5 | 680 | 3.6 |
| SEPT | 19.8 | .66 | .8 | .5 | 750 | 3.8 |
| OCT | 21.4 | .69 | 1.0 | .6 | 720 | 3.4 |
| NOV | 21.0 | .72 | .9 | .6 | 760 | 3.6 |
| DEC | 21.8 | .70 | .9 | .6 | 820 | 3.8 |
| TOTAL | 254.5 | - | - | - | 8740 | - |
| AVERAGE | - | .70 | MAX 1.3 | MIN .4 | - | 3.4 |

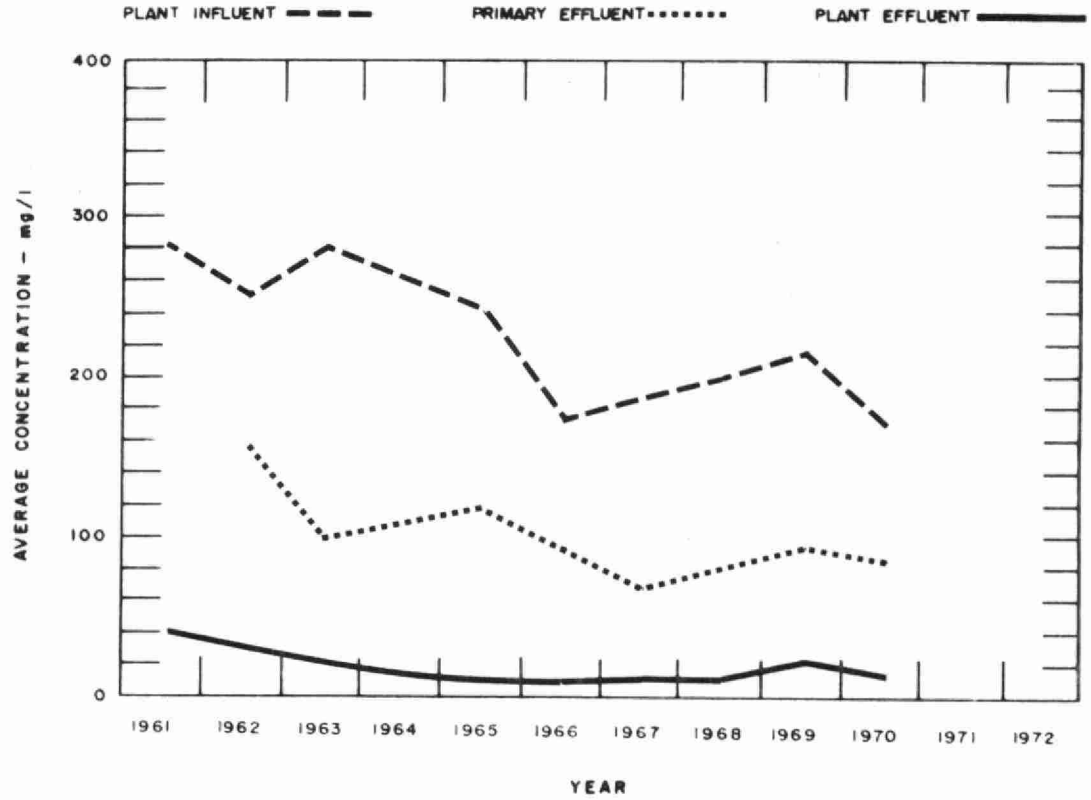



# BIOCHEMICAL OXYGEN DEMAND






# SUSPENDED SOLIDS



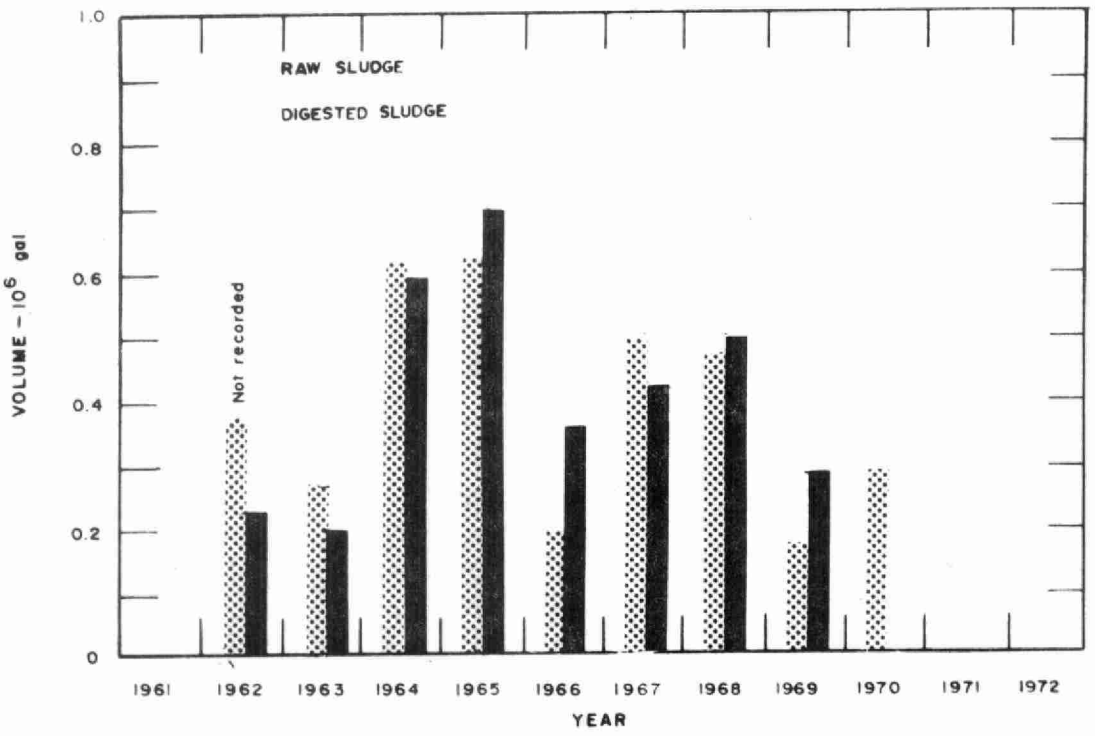
# PLANT EFFICIENCY

| MONTH | BIOCHEMICAL OXYGEN DEMAND | | | | | | SUSPENDED SOLIDS | | | | | | GRIT REMOVED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INFLUENT | | EFFLUENT | | REDUCTION | | INFLUENT | | EFFLUENT | | REDUCTION | | |
| | n | mg/l | n | mg/l | % | $10^3$ pounds | n | mg/l | n | mg/l | % | $10^3$ pounds | cu ft |
| JAN | 2 | 150 | 1 | 27 | 82 | 21 | 6 | 173 | 4 | 12 | 93 | 28 | 12 |
| FEB | 2 | 145 | 2 | 16 | 89 | 19 | 6 | 159 | 6 | 14 | 91 | 22 | 78 |
| MAR | 2 | 67 | 2 | 8 | 88 | 13 | 6 | 148 | 6 | 13 | 91 | 30 | 34 |
| APR | 2 | 78 | 2 | 10 | 87 | 20 | 7 | 101 | 7 | 13 | 87 | 26 | 32 |
| MAY | 2 | 82 | 2 | 18 | 78 | 16 | 6 | 115 | 5 | 13 | 89 | 26 | 18 |
| JUNE | 2 | 110 | 2 | 42 | 62 | 14 | 7 | 176 | 3 | 31 | 82 | 31 | 15 |
| JULY | 1 | 48 | 1 | 42 | 12 | 13 | 4 | 215 | 1 | 75 | 65 | 30 | 47 |
| AUG | 1 | 130 | 1 | 17 | 87 | 22 | 3 | 185 | 1 | 5 | 97 | 35 | 20 |
| SEPT | 1 | 140 | 2 | 26 | 90 | 46 | 5 | 186 | 6 | 16 | 92 | 36 | 18 |
| OCT | 1 | 140 | 2 | 36 | 74 | 22 | 5 | 186 | 6 | 21 | 21 | 35 | 14 |
| NOV | 2 | 215 | 2 | 29 | 87 | 39 | 6 | 202 | 6 | 15 | 93 | 39 | 64 |
| DEC | 3 | 147 | 3 | 12 | 92 | 29 | 8 | 167 | 8 | 12 | 93 | 34 | 14 |
| TOTAL | 21 | - | 19 | - | - | - | 69 | - | 60 | - | - | - | 366 |
| AVERAGE | - | 126 | - | 26 | 77 | 17 | - | 164 | - | 16 | 83 | 28 | - |

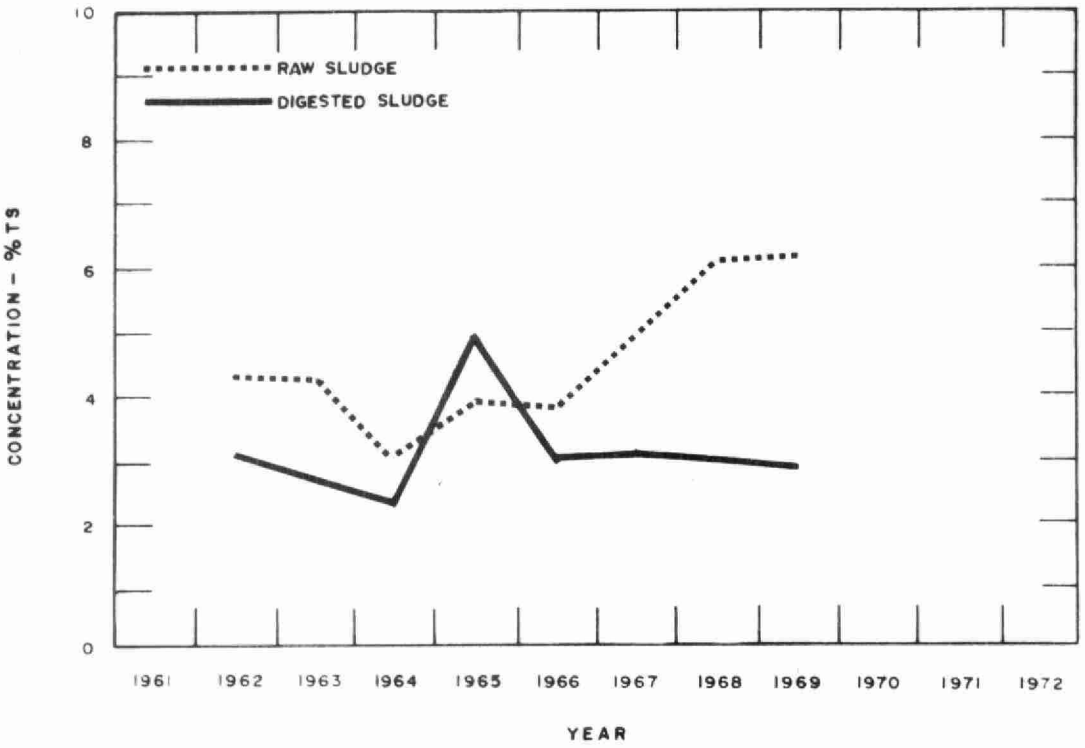
NOTE – n is the number of samples taken

# AERATION

| MONTH | AVG DAILY FLOW mil gal | AERATION INF. | | SECONDY. EFF. | | MLSS CONCN mg/l | F/M lb BOD / lb MLSS | AIR USED 1000 cu ft / lb BOD | WASTE SLUDGE $10^3$ lb/day |
|---|---|---|---|---|---|---|---|---|---|
| | | BOD mg/l | SS CONCN mg/l | BOD mg/l | SS CONCN mg/l | | | | |
| JAN | .5 | 110 | 88 | 27 | 12 | 2950 | .15 | - | 5.6 |
| FEB | .5 | 110 | 88 | 16 | 14 | 3280 | .13 | - | 9.7 |
| MAR | .7 | 75 | 72 | 8 | 13 | 3100 | .12 | - | 6.8 |
| APR | .8 | 73 | 61 | 10 | 13 | 2850 | .15 | - | 5.4 |
| MAY | .8 | 72 | 73 | 18 | 13 | 2420 | .16 | - | 7.7 |
| JUNE | .7 | 30 | 74 | 42 | 31 | 2320 | .07 | - | 6.6 |
| JULY | .7 | 42 | 93 | 42 | 75 | 2410 | .09 | - | 4.2 |
| AUG | .6 | 120 | 88 | 17 | 5 | 3410 | .16 | - | 8.3 |
| SEPT | .4 | 190 | 128 | 26 | 16 | 2800 | .32 | - | 4.2 |
| OCT | .4 | 100 | 91 | 36 | 21 | 3230 | .14 | - | 7.3 |
| NOV | .7 | 120 | 107 | 29 | 15 | 2860 | .21 | - | 5.1 |
| DEC | .7 | 90 | 78 | 12 | 12 | 2630 | .17 | - | 6.6 |
| TOTAL | - | - | - | - | - | - | - | - | - |
| AVERAGE | .6 | 94 | 87 | 24 | 14 | 2860 | .16 | - | - |


RAW SLUDGE
DIGESTED SLUDGE
Not recorded
VOLUME – $10^6$ gal
1.0
0.8
0.6
0.4
0.2
0
1961
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
YEAR

# DIGESTION


RAW SLUDGE
DIGESTED SLUDGE
CONCENTRATION – % TS
10
8
6
4
2
0
1961
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
YEAR

# SLUDGE DIGESTION and DISPOSAL

| MONTH | RAW SLUDGE PUMPED $10^3$ GAL | RAW SLUDGE HAULED CUYD |
|---|---|---|
| Jan. | - | 316 |
| Feb. | - | 332 |
| Mar. | - | 395 |
| Apr. | 25.9 | 79 |
| May | 42.2 | - |
| June | 49.5 | 120 |
| July | 46.6 | 120 |
| Aug. | 54.6 | 144 |
| Sept. | 44.2 | 344 |
| Oct. | 50.2 | 264 |
| Nov. | 58.0 | 216 |
| Dec. | 45.2 | 296 |
| Total | 313.2 | 2114 |
| Average | - | - |

*Water management in Ontario*